

a generic layer having electrical features and altering the electrical features to produce a personalized layer of the multi-layer substrate. The altering includes selectively filling vias in the generic layer with conductive material and removing portions of electrical wiring on the generic layer. The process further includes supplying a second generic layer identical to the first generic layer and altering the electrical features of the second generic layer to produce a second personalized layer different than the first personalized layer. The altering changes the generic layer into a plurality of differently personalized layers. The generic layer includes a grid of vias and/or a pattern of wiring useful with a plurality of differently personalized layers.

Another embodiment of the invention is a process for personalizing a multi-layer substrate structure that includes supplying a layer having generic electrical features and altering the generic electrical features to produce a personalized layer of the multi-layer substrate. The altering includes selectively filling vias in the layer with conductive material and removing portions of electrical wiring on the layer. The process further includes supplying a second layer identical to the first layer and altering the generic electrical features of the second layer to produce a second personalized layer different than the first personalized layer. The altering changes the generic layer into a plurality of differently personalized layers. The layer includes a generic grid of vias and/or a generic pattern of wiring useful with a plurality of differently personalized layers.

Yet another embodiment of the invention is a multi-layer substrate structure that includes at least one layer having generic electrical features altered to personalize the layer. The electrical features include vias selectively filled with conductive material and/or a wiring pattern having portions selectively removed.

5 The multi-layer substrate further includes a second layer similar to the first layer and having the generic electrical features altered differently than the first layer to personalize the second layer differently from the first layer. The layer can be changed into a plurality of differently personalized layers, and it includes a generic grid of vias and/or a generic pattern of wiring useful with a plurality of

10 differently personalized layers.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

15 Figure 1A is a schematic diagram of two layers of a ceramic substrate;

Figure 1B is a schematic diagram path personalized on a pair of sheets;

Figure 2 is a flowchart representation of the process of manufacturing multi-layer substrates.

Figures 3A-3C are schematic cross-sections of a ceramic sheet; and

20 Figure 4 is a perspective view of a ceramic sheet.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

The present invention includes a process/structure which personalizes generic signal or redistribution layers by severing connections and forming
5 conductive vias to create unique product parts. The invention reduces the cost and time associated with multi-layer ceramic (MLC) structures because generic electrical features (e.g., wiring and via patterns) are used for multiple products with different designs. Therefore, the cost associated with forming unique via grids and screen printing unique wiring or voltage patterns is avoided with the
10 invention. In other words, with the invention, the same generic wiring and via patterns can be used for many different products by simply making different vias in the pattern conductive and by severing different connections in the wiring patterns.

Generally, vias are in certain locations (i.e., grids), and signal layers
15 contain wiring in only one direction (i.e., X or Y), whereas voltage layers generally contain mesh patterns. One example of the invention is the fabrication of voltage or reference layers which use a common grid for many different products. The layers are personalized for the different products by making certain vias conductive and by severing connections on the layers (e.g., removing portions
20 of the wiring patterns). Currently, in product fabrication such as multi-layer